METHOD AND SYSTEM FOR VIEWING SCALABLE DOCUMENTS

[0001] This application is related to pending application U.S. Ser. No. 09/221,207, filed on Dec. 23, 1998, entitled "A Method and System for Client-less Viewing of Scalable Documents."

FIELD OF THE INVENTION

[0002] The present invention relates to electronic documents containing raster images and to pre-prcss graphic arts.

BACKGROUND OF THE INVENTION

[0003] PostScript is a resoluton-independent document format. PostScript fonts can be enlarged or reduced in size to accommodate any viewing resolution. When a viewer zooms in or out of a PostScript document, the text characters automatically scale accordingly. Thus it can be said that PostScript font characters are "scalable."

[0004] Similarly, graphical objects based on vector graphics consisting of line segments and curves arc also scalable. The line segments and curves can be enlarged or reduced in size by appropriately modifying the pixel coordinates of their control points.

[0005] Raster graphics, on the other hand, is not scalable. An image expressed in raster graphics is by its nature pixel resolution specific, and to enlarge or reduce the image involves digital image filtering and interpolation. Moreover, a raster image cannot be stretched beyond its original pixel resolution without introducing additional color data, such as interpolated color data, to the original color data.

[0006] In the field of pre-press graphic arts, routinely processed documents contain high resolution raster graphics, with quality levels at or near photographic quality. Such documents are typically stored electronically as very large files, the large size being due primarily to the raster images therewithin. As a result, such documents arc unwieldy to process and to transmit. Traditionally pre-press service providers prepared sample proofs of jobs for their customers, and the customers came to the company shops in person to inspect the proofs, before the print productions were ran. Today, however, many pre-press service providers use the Internet as a way to transfer jobs to customers for proofing. This has many advantages. The customer does not have to come to the shop in person. The customer does not have to inspect his job and mark his changes "on the spot." The customer can show his proof to others, and solicit their feedback. Proofs can be sent back and forth between the shop and the customer more often than before.

[0007] Use of the Internet for proofing has its shortcomings, though. On account of the large sizes of the files involved, when a customer proofs an electronic pre-press job on-line, there are unacceptable delays in interactively viewing the job, and in transmitting the job back and forth between the pre-press computer and a customer computer.

[0008] These delays can be mitigated somewhat by using only low resolution images in the document that is transmitted for proofing, but this is done at the expense of lost quality. A customer proofing a job with low resolution images is not able to inspect the quality of the images—which is one of the main objectives of proofing.

SUMMARY OF THE INVENTION

[0009] The present invention overcomes bandwidth limitations for on-line proofing of pre-print jobs by using a new type of document and a new type of client/server architecture. A standard document containing high resolution images is replaced by an image-less document, in which the high resolution images are removed and references to the images are substituted therefor. The high resolution images are stored on an image server, and transmitted using an Internet protocol that interactively transmits relatively small amounts of the image data in response to a customer's interactive viewing of a document. Specifically, the image server transmits image data used to generate a portion of an image at a specific resolution, necessary to display a portion of a page at a specific resolution requested by a customer. As the customer requests to see different portions of the page at different resolutions. The image server transmits additional image data as needed. The customer's client computer caches image data it receives, so that whenever the same image data is needed a second time it is readily available in the client computer.

[0010] The present invention also provides an electronic document, including one or more raster images, which is scalable. The raster images are referenced within the document through links. The scalable document of the present invention can be enlarged or reduced to any desired resolution, making the entire document scalable—text characters, graphical objects and raster images.

[0011] Regardless of the viewing configuration, a raster image referenced within the scalable document of the present invention can automatically scale according to the viewing resolution. For example, suppose a 6"×8" photograph is converted to a high quality digital image by scanning at 600 dots per inch (dpi). This produces a 3,600× 4,800 pixel image, which is embedded into a page of the document.

[0012] When such a page is viewed at normal size on a view mouinitor having 72 dpi resolution, the referenced image is scaled to 432×576 pixels for purposes of display. If a user zooms in by a factor of two, to see a portion of the page containing the image at higher resolution, the referenced image is scaled to 864×1,152 pixels. Thus the dimensions of the image referenced within the document automatically scale to twice their initial values. If the document is printed on a 300 dpi color printer, the referenced image is scaled to 1,800×2,400 pixels in order to produce as high quality a print as possible using the color printer as an output device.

[0013] In a preferred embodiment of the present invention an original document is converted to an image-less document by removing the images contained within the original document and replacing them with references. The referenced images arm stored on one or more image servers on the Internet or any other suitable computer network, and may be viewed using client computers. As the image-less document contains references to raster images, rather than the images themselves, the size of the image-less document of the present invention is relatively small.

[0014] Upon initial display, the document includes screen-size images. Upon delivery or print, the document will include images scaled to the appropriate device resolution.